

This is a machine translation of Japanese Patent Laid-Open Publication No. 2002-261679 we extract from JPO Website.

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] Mobile communication equipment equipped with the change means which changes the connection condition of a nondirectional antenna, a directional antenna, the transceiver section, and said nondirectional antenna and said directional antenna and said transceiver section, and the control means which controls this change means.

[Claim 2] Mobile communication equipment according to claim 1 with which said control means controls said change means according to the busy condition of said mobile communication equipment.

[Claim 3] Mobile communication equipment according to claim 1 or 2 with which said control means controls said change means according to the reinforcement of the input signal received by said transceiver section.

[Claim 4] It is the mobile communication equipment according to claim 2 to which said directional antenna and said transceiver section are connected by said change means when it is a cell phone unit, and said nondirectional antenna and said transceiver section are connected by said change means and it is a voice message at the times other than a voice message.

[Claim 5] It is the mobile communication equipment according to claim 2 to which it is the cell phone unit which has a housing, said directional antenna and said transceiver section are connected to by said change means when said touch sensor has detected contact, while having the loudspeaker which outputs voice, and the touch sensor formed in the part where said loudspeaker of said case is arranged, and said nondirectional antenna and said transceiver section are connected by said change means when said touch sensor has not detected contact.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to mobile communication equipment. It is related with the cell phone unit especially used in the location near a user's head at the time of a voice message.

[0002]

[Description of the Prior Art] In mobile communication equipment, the nondirectional antenna is usually used so that any busy conditions can secure the gain of an antenna. On the other hand, we are anxious about the electric wave radiated from an antenna these days in that there is a possibility of having a bad influence on the body, and when an electric wave is irradiated by especially the head, we are anxious about the bad influence of an about.

[0003]

[Problem(s) to be Solved by the Invention] Since there is such concern, it is required that the electric wave radiated from an antenna to the body should be mitigated. It is possible to use a directional antenna towards not radiating an electric wave on a body side instead of the nondirectional antenna used conventionally as an approach of mitigating the electric wave radiated from an antenna to the body. However, by this approach, when mobile communication equipment awaits, it is in a condition and a base station suits a body side, the gain of an antenna becomes low rather than the nondirectional antenna used conventionally, and there is a possibility of failing to take arrival of the mail.

[0004] This invention aims at offering the mobile communication equipment with which the electric wave radiated from an antenna to the body is mitigated and awaited in view of the above-mentioned trouble, and antenna gain does not become low in a condition.

[0005]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, in the mobile communication equipment concerning this invention, it has the change means which changes the connection condition of a nondirectional antenna, a

directional antenna, the transceiver section, and said nondirectional antenna and said directional antenna and said transceiver section, and the control means which controls this change means.

[0006] Furthermore, you may make it said control means control said change means according to the busy condition of said mobile communication equipment. In this case, as long as said mobile communication equipment is a cell phone unit, said nondirectional antenna and said transceiver section are connected by said change means, and when it is a voice message, said directional antenna and said transceiver section may be made to be connected by said change means at the times other than a voice message. Moreover, the loudspeaker which will output voice if said mobile communication equipment is the cell phone unit which has a case, The touch sensor formed in the part where said loudspeaker of said case is arranged, When the preparation and said touch sensor have detected contact, said directional antenna and said transceiver section are connected by said change means. When said touch sensor has not detected contact, said nondirectional antenna and said transceiver section may be made to be connected by said change means.

[0007] Moreover, you may make it said control means control said change means according to the reinforcement of the input signal received by said transceiver section.

[0008]

[Embodiment of the Invention] The case where this invention is applied to a cell phone unit with reference to a drawing about 1 operation gestalt of this invention is explained. The perspective view of the cell phone unit of the first operation gestalt is shown in drawing 1 (a), and drawing of longitudinal section of AA cutting plane of drawing 1 (a) is shown in drawing 1 (b). The cell phone unit of the first operation gestalt equips the upper part with the nondirectional antenna 1. The electric-wave radiation pattern P1 of a nondirectional antenna 1 is indirectivity in a horizontal plane. In addition, as a nondirectional antenna 1, the monopole antenna which has a helical antenna is mentioned, for example to a point.

[0009] Furthermore, the cell phone unit of the first operation gestalt equips the interior with the directional antenna 2. The directional antenna 2 is arranged on the printed circuit board 3 prepared in the cell phone unit of the first operation gestalt. To the direction of a tooth back of a cell phone unit, the electric-wave radiation pattern P2 of a directional antenna 2 has many amounts of radiation of an electric wave, and its amount of radiation of an electric wave has decreased to the direction of a transverse plane of the cell phone unit which becomes a body side. Therefore, when the directional antenna 2 is being used, the electric wave radiated on the body from an antenna compared with the case where a nondirectional antenna 1 is used

can be lessened. In addition, as a directional antenna 2, reverse F antennas etc. are mentioned, for example.

[0010] And the year piece section 4 (part where the loudspeaker 13 of a case 12 is arranged) is formed in the transverse-plane upper part of the cell phone unit of the first operation gestalt. Moreover, a display 5 and the key section 6 are formed in the transverse-plane center section of the cell phone unit of the first operation gestalt, and the microphone 7 is formed in the transverse-plane lower part of the cell phone unit of the first operation gestalt.

[0011] Next, the circuit block diagram of the cellular phone of the first operation gestalt is shown in drawing 2. A nondirectional antenna 1 and a directional antenna 2 are connected to the transceiver section 9 through a circuit changing switch 8, respectively. A control circuit 10 creates a control signal based on the signal from the transceiver section 9 and the key section 6, and outputs it to a circuit changing switch 8. Moreover, the control circuit 10 is equipped with memory 10A which has memorized operations sequence etc.

[0012] Next, actuation of a control circuit 10 is explained with reference to the circuit block diagram of drawing 2, and the flow chart of drawing 3. If the main power supply of the cell phone unit of the first operation gestalt will be in ON condition, the flow chart of drawing 3 will start. A control circuit 10 outputs a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S10). Next, it judges whether it is a voice talk state (step S20). A control circuit 10 is judged to be voice message initiation, when a call in or call origination occurs and a circuit is connected after that.

[0013] If it is not a voice talk state (No of step S20), it will shift to step S20. The cell phone unit of the first operation gestalt is in the condition of having received the electric wave of a base station intermittently until it will be in a voice talk state (this condition is hereafter called "the waiting receptacle condition for an intermission"). That is, it is supervising whether based on the electric wave of a base station, there is any arrival of the mail using a nondirectional antenna 1 in the waiting receptacle condition for an intermission.

[0014] Since the non-directed antenna 1 which is indirectivity is chosen in the horizontal plane in the waiting receptacle condition for an intermission, the gain of an antenna does not get extremely bad, whether the cellular phone of the first operation gestalt has turned to what kind of direction or the user of the cellular phone of the first operation gestalt does the method of what kind of use.

[0015] On the other hand, if it is a voice talk state (Yes of step S20), a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional

antenna 2 (step S30). Then, it judges whether it is a voice talk state again (step S40). If a circuit is cut by the message carbon button of the key section 6 being pushed and a voice message is completed (No of step S40), it will shift to step S10.

[0016] When a control circuit 10 performs such actuation, at the time of the voice message to which a user's head approaches the first cell phone unit, a directional antenna 2 will surely be chosen. Thereby, the electric wave radiated on the body, especially a head from an antenna is mitigable. Moreover, in the waiting receptacle condition for an intermission, since a nondirectional antenna 1 is chosen, there is no possibility that the gain of an antenna may often fail to take arrival of the mail.

[0017] However, when a control circuit 10 performs such actuation, when it shifts to step S30, the gain of an antenna worsens depending on the sense of the cell phone unit of the first operation gestalt, and when the worst, there is a possibility that a circuit may be cut. What is necessary is just to make it a configuration which is changed to a nondirectional antenna 1, when having chosen the directional antenna 2 and the gain of an antenna worsens in order to cancel such a trouble. In this case, a control circuit 10 shall operate according to the flow chart Fig. shown in drawing 4, and a control circuit 10 shall be equipped with reception and a timer for the on-the-strength detection result of an input signal from the transceiver section 9. In addition, in drawing 4, the same sign is attached about the same part as drawing 2. Hereafter, the flow chart of drawing 4 is explained.

[0018] If the main power supply of the cell phone unit of the first operation gestalt will be in ON condition, a flow chart will start. A control circuit 10 outputs a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S10). Next, it judges whether it is a voice talk state (step S20).

[0019] If it is not a voice talk state (No of step S20), it will shift to step S20. On the other hand, if it is a voice talk state (Yes of step S20), it will shift to step S22.

[0020] If the reinforcement of an input signal is beyond a predetermined value (Yes of step S22), a control circuit 10 will shift to step S34, after outputting a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S30). On the other hand, if the reinforcement of an input signal is not beyond a predetermined value (No of step S22), a control circuit 10 will shift to step S34, after outputting a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S32).

[0021] In step S34, a control circuit 10 starts a timer, after resetting time amount T to 0. Then, it judges whether it is a voice talk state (step S40). If it is a voice talk state (Yes

of step S40), it will judge whether time amount T turned into the predetermined time amount alpha (step S42). If time amount T turns into the predetermined time amount alpha (Yes of step S42), it shifts to step S22 and time amount T is not the predetermined time amount alpha (No of step S42), it shifts to step S40. If a circuit is cut by the message carbon button of the key section 6 being pushed on the other hand and a voice message is completed (No of step S40), it will shift to step S10.

[0022] When a control circuit 10 performs such actuation, and the reinforcement of an input signal is under a predetermined value, even if it is [voice] under message, a nondirectional antenna 1 is chosen. While the fault which a circuit cuts during a voice message decreases by this, when the reinforcement of an input signal is beyond a predetermined value, a directional antenna is chosen during a voice message. Therefore, although it is less than the time of a control circuit 10 operating the flow chart of drawing 2, compared with the case where only the conventional nondirectional antenna is used, the electric wave radiated on the body, especially a head from an antenna is mitigable.

[0023] Moreover, you may make it a control circuit 10 operate according to the flow chart Fig. shown in drawing 5 so that the three modes can be chosen according to liking of a user. In addition, in drawing 5, the same sign is given to the same part as drawing 2.

[0024] If the main power supply of a cell phone unit will be in ON condition, a flow chart will start. A control circuit 10 judges whether the mode of antenna selection is set as which the mode (step S5). In addition, the mode which a user can set up the mode of antenna selection now by the key section 6, and was set up is memorized by memory 10A in a control circuit 10.

[0025] If judged with it being Mode a in step S5, a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S10). Next, it judges whether it is a voice talk state (step S20). If it is not a voice talk state (No of step S20), it shifts to step S5 and the pocket equipment of the first operation gestalt will be in the waiting receptacle condition for an intermission. On the other hand, if it is a voice talk state (Yes of step S20), a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S30). Then, it judges whether it is a voice talk state again (step S40). If a voice message is completed (No of step S40), it shifts to step S5 and the cell phone unit of the first operation gestalt will be in the waiting receptacle condition for an intermission again.

[0026] If judged with it being Mode b in step S5, a control circuit 10 will output a control signal so that a circuit

changing switch 8 may choose a nondirectional antenna 1 (step S50). Next, it judges whether it is a voice talk state (step S60). If it is not a voice talk state (No of step S60), it shifts to step S5 and the cell phone unit of the first operation gestalt will be in the waiting receptacle condition for an intermission. On the other hand, if it is a voice talk state (Yes of step S20), it will judge after that whether it is a voice talk state again (step S70). If a voice message is completed (No of step S70), it shifts to step S5 and the cell phone unit of the first operation gestalt will be in the waiting receptacle condition for an intermission.

[0027] If judged with it being Mode c in step S5, a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S80). Next, it judges whether it is a voice talk state (step S90). If it is not a voice talk state (No of step S90), it shifts to step S5 and the cell phone unit of the first operation gestalt will be in the waiting receptacle condition for an intermission. On the other hand, if it is a voice talk state (Yes of step S90), it will judge after that whether it is a voice talk state again (step S100). If a voice message is completed (No of step S100), it shifts to step S5 and the cellular phone of the first operation gestalt will be in the waiting receptacle condition for an intermission.

[0028] During a voice message, except chooses a nondirectional antenna 1 and Mode a is the mode which chooses a directional antenna 2 during a voice message. Since Mode b always chooses a nondirectional antenna 1, although there is a possibility of failing to take arrival of the mail depending on the sense of a cell phone unit, the electric wave radiated on the body from an antenna is most mitigable. Since Mode c always chooses a directional antenna 2, it is the mode for which it was suitable when a base station used a cell phone unit in the area where a circuit is easy to be cut during a voice message few. In addition, you may make it change a directional antenna/nondirectional antenna according to the reinforcement of an input signal like the flow chart which showed Mode a to drawing 4 .

[0029] Next, the cell phone unit of the second operation gestalt is explained. The perspective view of the cell phone unit of the second operation gestalt is shown in drawing 6 (a), and drawing of longitudinal section of BB cutting plane of drawing 6 (a) is shown in drawing 6 (b). In addition, in drawing 6 , the same sign is given to the same part as drawing 1 , and explanation is omitted. The touch sensor 11 is formed in the year piece section 4. As a touch sensor 11, the sensor equipped with the piezoelectric device, for example is mentioned.

[0030] Next, the circuit block diagram of the cellular phone of the second operation gestalt is shown in drawing 7 . In

addition, in drawing 7 , the same sign is given to the same part as drawing 2 , and explanation is omitted. The detection signal detected by the touch sensor 11 is inputted into a control circuit 10.

[0031] Next, actuation of a control circuit 10 is explained with reference to the circuit block diagram of drawing 7 , and the flow chart of drawing 8 . A control circuit 10 outputs a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S210). Next, it judges whether the detection signal from a touch sensor 11 is inputted (step S220). If the detection signal from a touch sensor 11 is inputted (Yes of step S220), a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S230). Then, it judges whether the detection signal from a touch sensor 11 is inputted again (step S240). If the detection signal from a touch sensor 11 is not inputted (No of step S240), it shifts to step S210.

[0032] In the cell phone unit of the second operation gestalt, since a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 if it is not related whether it is [voice] under message or there is nothing and a user detects that the lug was applied to the IYAPISU section 4 in a touch sensor 11, the electric wave radiate on a user head from an antenna is mitigable.

[0033] Moreover, also in the cell phone unit of the second operation gestalt, you may make it a configuration which a control circuit 10 may control a circuit changing switch 8 according to the reinforcement of an input signal like the cell phone unit of the first operation gestalt, and has the three modes of antenna selection.

[0034] In addition, in a cell phone unit, a non-voice communication link is also performed like data communication. In the cell phone unit of the first operation gestalt, since a non-voice communication link is not [voice / be / it] under message, a nondirectional antenna is chosen during a non-voice communication link. Moreover, also in the cell phone unit of the second operation gestalt, during a non-voice communication link, since the lug does not touch the year piece section, a nondirectional antenna is chosen. Generally, in a non-voice communication link, there is an inclination for the direction of mobile communication equipment to tends to be changed by the user compared with a voice message. For this reason, the cell phone unit of the first operation gestalt and the cell phone unit of the second operation gestalt are considered as the configuration as which a nondirectional antenna is chosen by the non-voice communication link. However, this invention may be set up so that it may connect with a directional antenna at the time of the communication link which is not limited to the above-mentioned operation gestalt and includes not only a

chisel but a non-voice communication link at the time of a voice message.

[0035] Moreover, although this invention was applied to the cell phone unit with the above-mentioned operation gestalt, this invention is applicable about the mobile communication equipment at large which is not limited to this and equipped with the radio function.

[0036]

[Effect of the Invention] Since it has the change means which changes the connection condition of a nondirectional antenna, a directional antenna, the transceiver section, and the nondirectional antenna and a directional antenna and the transceiver section, and the control means which controls a change means according to this invention, the electric wave radiated from an antenna to the body is mitigable by connecting the transceiver section with a directional antenna, it awaits by awaiting and connecting a nondirectional antenna and the transceiver section to a condition, and antenna gain can be prevented from becoming low in a condition.

[0037] Moreover, since a control means controls a change means according to the busy condition of mobile communication equipment, it awaits by awaiting and connecting a nondirectional antenna and the transceiver section to a condition, and antenna gain can be prevented from becoming low in a condition according to this invention. And the electric wave radiated from an antenna to the body is mitigable by connecting a directional antenna and the transceiver section to the body in a part or all of a busy condition on which an electric wave is radiated from an antenna.

[0038] Moreover, since said control means controls said change means according to the reinforcement of the input signal received by the transceiver section according to this invention, when the reinforcement of an input signal becomes low, a nondirectional antenna and the transceiver section can be connected. Thereby, fear of the line disconnection under communication link decreases.

[0039] Moreover, the electric wave radiated from an antenna to the body when it awaits since the directional-antenna and transceiver section is connected by the change means when the nondirectional antenna and transceiver section is connected [according to this invention] by the change means at the times other than a voice message in the case of a cell phone unit and it is a voice message, and, as for the time of a condition, antenna gain does not become low but it is a voice message is mitigable. Furthermore, when it is the non-voice communication link with the inclination for the direction of a cell phone unit to tends to be changed by the user compared with a voice message generally, the transceiver section will be connected with a nondirectional antenna and fear of the line disconnection under

non-voice communication link decreases.

[0040] Moreover, while having [according to this invention] the loudspeaker which outputs voice, and the touch sensor formed in the part where said loudspeaker of a case is arranged in the case of the cell phone unit which has a housing Since a directional antenna and the transceiver section are connected by the change means when the touch sensor has detected contact, and a nondirectional antenna and the transceiver section are connected by the change means when the touch sensor has not detected contact It awaits, and while antenna gain does not become low in a condition but the touch sensor is detecting contact (i.e., when a cell phone unit is in the location near a user's head), the electric wave radiated from an antenna to the body can be mitigated.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention relates to mobile communication equipment. It is related with the cell phone unit especially used in the location near a user's head at the time of a voice message.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] In mobile communication equipment, the nondirectional antenna is usually used so that any busy conditions can secure the gain of an antenna. On the other hand, we are anxious about the electric wave radiated from an antenna these days in that there is a possibility of having a bad influence on the body, and when an electric wave is irradiated by especially the head, we are anxious about the bad influence of an about.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] Since it has the change means which changes the connection condition of a nondirectional antenna, a directional antenna, the transceiver section, and the nondirectional antenna and a directional antenna and the transceiver section, and the control means which controls a change means according to this invention, the electric wave radiated from an antenna to the body is mitigable by connecting the transceiver section with a directional antenna, it awaits by awaiting and connecting a nondirectional antenna and the transceiver section to a condition, and antenna gain can be prevented from becoming low in a condition.

[0037] Moreover, since a control means controls a change means according to the busy condition of mobile communication equipment, it awaits by awaiting and connecting a nondirectional antenna and the transceiver section to a condition, and antenna gain can be prevented from becoming low in a condition according to this invention. And the electric wave radiated from an antenna to the body is mitigable by connecting a directional antenna and the transceiver section to the body in a part or all of a busy condition on which an electric wave is radiated from an antenna.

[0038] Moreover, since said control means controls said change means according to the reinforcement of the input signal received by the transceiver section according to this invention, when the reinforcement of an input signal becomes low, a nondirectional antenna and the transceiver section can be connected. Thereby, fear of the line disconnection under communication link decreases.

[0039] Moreover, the electric wave radiated from an antenna to the body when it awaits since the directional-antenna and transceiver section is connected by the change means when the nondirectional antenna and transceiver section is connected [according to this invention] by the change means at the times other than a voice message in the case of a cell phone unit and it is a voice message, and, as for the time of a condition, antenna gain does not become low but it is a voice message is mitigable. Furthermore, when it is the non-voice communication link with the inclination for the direction of a cell phone unit

to tends to be changed by the user compared with a voice message generally, the transceiver section will be connected with a nondirectional antenna and fear of the line disconnection under non-voice communication link decreases.

[0040] Moreover, while having [according to this invention] the loudspeaker which outputs voice, and the touch sensor formed in the part where said loudspeaker of a case is arranged in the case of the cell phone unit which has a housing Since a directional antenna and the transceiver section are connected by the change means when the touch sensor has detected contact, and a nondirectional antenna and the transceiver section are connected by the change means when the touch sensor has not detected contact It awaits, and while antenna gain does not become low in a condition but the touch sensor is detecting contact (i.e., when a cell phone unit is in the location near a user's head), the electric wave radiated from an antenna to the body can be mitigated.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since there is such concern, it is required that the electric wave radiated from an antenna to the body should be mitigated. It is possible to use a directional antenna towards not radiating an electric wave on a body side instead of the nondirectional antenna used conventionally as an approach of mitigating the electric wave radiated from an antenna to the body. However, by this approach, when mobile communication equipment awaits, it is in a condition and a base station suits a body side, the gain of an antenna becomes low rather than the nondirectional antenna used conventionally, and there is a possibility of failing to take arrival of the mail.

[0004] This invention aims at offering the mobile communication equipment with which the electric wave radiated from an antenna to the body is mitigated and awaited in view of the above-mentioned trouble, and antenna gain does not become low in a condition.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, in the mobile communication equipment concerning this invention, it has the change means which changes the connection condition of a nondirectional antenna, a directional antenna, the transceiver section, and said nondirectional antenna and said directional antenna and said transceiver section, and the control means which controls this change means.

[0006] Furthermore, you may make it said control means control said change means according to the busy condition of said mobile communication equipment. In this case, as long as said mobile communication equipment is a cell phone unit, said nondirectional antenna and said transceiver section are connected by said change means, and when it is a voice message, said directional antenna and said transceiver section may be made to be connected by said change means at the times other than a voice message. Moreover, the loudspeaker which will output voice if said mobile communication equipment is the cell phone unit which has a case, The touch sensor formed in the part where said loudspeaker of said case is arranged, When the preparation and said touch sensor have detected contact, said directional antenna and said transceiver section are connected by said change means. When said touch sensor has not detected contact, said nondirectional antenna and said transceiver section may be made to be connected by said change means.

[0007] Moreover, you may make it said control means control said change means according to the reinforcement of the input signal received by said transceiver section.

[0008]

[Embodiment of the Invention] The case where this invention is applied to a cell phone unit with reference to a drawing about 1 operation gestalt of this invention is explained. The perspective view of the cell phone unit of the first operation gestalt is shown in drawing 1 (a), and drawing of longitudinal section of AA cutting plane of drawing 1 (a) is shown in drawing 1 (b). The cell phone unit of the first operation gestalt equips the upper part with the nondirectional antenna 1. The electric-wave radiation pattern P1 of a nondirectional antenna

1 is indirectivity in a horizontal plane. In addition, as a nondirectional antenna 1, the monopole antenna which has a helical antenna is mentioned, for example to a point.

[0009] Furthermore, the cell phone unit of the first operation gestalt equips the interior with the directional antenna 2. The directional antenna 2 is arranged on the printed circuit board 3 prepared in the cell phone unit of the first operation gestalt. To the direction of a tooth back of a cell phone unit, the electric-wave radiation pattern P2 of a directional antenna 2 has many amounts of radiation of an electric wave, and its amount of radiation of an electric wave has decreased to the direction of a transverse plane of the cell phone unit which becomes a body side. Therefore, when the directional antenna 2 is being used, the electric wave radiated on the body from an antenna compared with the case where a nondirectional antenna 1 is used can be lessened. In addition, as a directional antenna 2, reverse F antennas etc. are mentioned, for example.

[0010] And the year piece section 4 (part where the loudspeaker 13 of a case 12 is arranged) is formed in the transverse-plane upper part of the cell phone unit of the first operation gestalt. Moreover, a display 5 and the key section 6 are formed in the transverse-plane center section of the cell phone unit of the first operation gestalt, and the microphone 7 is formed in the transverse-plane lower part of the cell phone unit of the first operation gestalt.

[0011] Next, the circuit block diagram of the cellular phone of the first operation gestalt is shown in drawing 2. A nondirectional antenna 1 and a directional antenna 2 are connected to the transceiver section 9 through a circuit changing switch 8, respectively. A control circuit 10 creates a control signal based on the signal from the transceiver section 9 and the key section 6, and outputs it to a circuit changing switch 8. Moreover, the control circuit 10 is equipped with memory 10A which has memorized operations sequence etc.

[0012] Next, actuation of a control circuit 10 is explained with reference to the circuit block diagram of drawing 2, and the flow chart of drawing 3. If the main power supply of the cell phone unit of the first operation gestalt will be in ON condition, the flow chart of drawing 3 will start. A control circuit 10 outputs a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S10). Next, it judges whether it is a voice talk state (step S20). A control circuit 10 is judged to be voice message initiation, when a call in or call origination occurs and a circuit is connected after that.

[0013] If it is not a voice talk state (No of step S20), it will shift to step S20. The cell phone unit of the first operation gestalt is in the condition of having received the electric wave of a base station intermittently until it will be in a voice

talk state (this condition is hereafter called "the waiting receptacle condition for an intermission"). That is, it is supervising whether based on the electric wave of a base station, there is any arrival of the mail using a nondirectional antenna 1 in the waiting receptacle condition for an intermission.

[0014] Since the non-directed antenna 1 which is indirectivity is chosen in the horizontal plane in the waiting receptacle condition for an intermission, the gain of an antenna does not get extremely bad, whether the cellular phone of the first operation gestalt has turned to what kind of direction or the user of the cellular phone of the first operation gestalt does the method of what kind of use.

[0015] On the other hand, if it is a voice talk state (Yes of step S20), a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S30). Then, it judges whether it is a voice talk state again (step S40). If a circuit is cut by the message carbon button of the key section 6 being pushed and a voice message is completed (No of step S40), it will shift to step S10.

[0016] When a control circuit 10 performs such actuation, at the time of the voice message to which a user's head approaches the first cell phone unit, a directional antenna 2 will surely be chosen. Thereby, the electric wave radiated on the body, especially a head from an antenna is mitigable. Moreover, in the waiting receptacle condition for an intermission, since a nondirectional antenna 1 is chosen, there is no possibility that the gain of an antenna may often fail to take arrival of the mail.

[0017] However, when a control circuit 10 performs such actuation, when it shifts to step S30, the gain of an antenna worsens depending on the sense of the cell phone unit of the first operation gestalt, and when the worst, there is a possibility that a circuit may be cut. What is necessary is just to make it a configuration which is changed to a nondirectional antenna 1, when having chosen the directional antenna 2 and the gain of an antenna worsens in order to cancel such a trouble. In this case, a control circuit 10 shall operate according to the flow chart Fig. shown in drawing 4, and a control circuit 10 shall be equipped with reception and a timer for the on-the-strength detection result of an input signal from the transceiver section 9. In addition, in drawing 4, the same sign is attached about the same part as drawing 2. Hereafter, the flow chart of drawing 4 is explained.

[0018] If the main power supply of the cell phone unit of the first operation gestalt will be in ON condition, a flow chart will start. A control circuit 10 outputs a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S10). Next, it judges whether it is a voice talk state (step S20).

[0019] If it is not a voice talk state (No of step S20), it will shift to step S20. On the other hand, if it is a voice talk state (Yes of step S20), it will shift to step S22.

[0020] If the reinforcement of an input signal is beyond a predetermined value (Yes of step S22), a control circuit 10 will shift to step S34, after outputting a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S30). On the other hand, if the reinforcement of an input signal is not beyond a predetermined value (No of step S22), a control circuit 10 will shift to step S34, after outputting a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S32).

[0021] In step S34, a control circuit 10 starts a timer, after resetting time amount T to 0. Then, it judges whether it is a voice talk state (step S40). If it is a voice talk state (Yes of step S40), it will judge whether time amount T turned into the predetermined time amount alpha (step S42). If time amount T turns into the predetermined time amount alpha (Yes of step S42), it shifts to step S22 and time amount T is not the predetermined time amount alpha (No of step S42), it shifts to step S40. If a circuit is cut by the message carbon button of the key section 6 being pushed on the other hand and a voice message is completed (No of step S40), it will shift to step S10.

[0022] When a control circuit 10 performs such actuation, and the reinforcement of an input signal is under a predetermined value, even if it is [voice] under message, a nondirectional antenna 1 is chosen. While the fault which a circuit cuts during a voice message decreases by this, when the reinforcement of an input signal is beyond a predetermined value, a directional antenna is chosen during a voice message. Therefore, although it is less than the time of a control circuit 10 operating the flow chart of drawing 2, compared with the case where only the conventional nondirectional antenna is used, the electric wave radiated on the body, especially a head from an antenna is mitigable.

[0023] Moreover, you may make it a control circuit 10 operate according to the flow chart Fig. shown in drawing 5 so that the three modes can be chosen according to liking of a user. In addition, in drawing 5, the same sign is given to the same part as drawing 2.

[0024] If the main power supply of a cell phone unit will be in ON condition, a flow chart will start. A control circuit 10 judges whether the mode of antenna selection is set as which the mode (step S5). In addition, the mode which a user can set up the mode of antenna selection now by the key section 6, and was set up is memorized by memory 10A in a control circuit 10.

[0025] If judged with it being Mode a in step S5, a control circuit 10 will output a control signal so that a circuit

changing switch 8 may choose a nondirectional antenna 1 (step S10). Next, it judges whether it is a voice talk state (step S20). If it is not a voice talk state (No of step S20), it shifts to step S5 and the pocket equipment of the first operation gestalt will be in the waiting receptacle condition for an intermission. On the other hand, if it is a voice talk state (Yes of step S20), a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S30). Then, it judges whether it is a voice talk state again (step S40). If a voice message is completed (No of step S40), it shifts to step S5 and the cell phone unit of the first operation gestalt will be in the waiting receptacle condition for an intermission again.

[0026] If judged with it being Mode b in step S5, a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S50). Next, it judges whether it is a voice talk state (step S60). If it is not a voice talk state (No of step S60), it shifts to step S5 and the cell phone unit of the first operation gestalt will be in the waiting receptacle condition for an intermission. On the other hand, if it is a voice talk state (Yes of step S20), it will judge after that whether it is a voice talk state again (step S70). If a voice message is completed (No of step S70), it shifts to step S5 and the cell phone unit of the first operation gestalt will be in the waiting receptacle condition for an intermission.

[0027] If judged with it being Mode c in step S5, a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S80). Next, it judges whether it is a voice talk state (step S90). If it is not a voice talk state (No of step S90), it shifts to step S5 and the cell phone unit of the first operation gestalt will be in the waiting receptacle condition for an intermission. On the other hand, if it is a voice talk state (Yes of step S90), it will judge after that whether it is a voice talk state again (step S100). If a voice message is completed (No of step S100), it shifts to step S5 and the cellular phone of the first operation gestalt will be in the waiting receptacle condition for an intermission.

[0028] During a voice message, except chooses a nondirectional antenna 1 and Mode a is the mode which chooses a directional antenna 2 during a voice message. Since Mode b always chooses a nondirectional antenna 1, although there is a possibility of failing to take arrival of the mail depending on the sense of a cell phone unit, the electric wave radiated on the body from an antenna is most mitigable. Since Mode c always chooses a directional antenna 2, it is the mode for which it was suitable when a base station used a cell phone unit in the area where a circuit is easy to be cut during a voice message few. In

addition, you may make it change a directional antenna/nondirectional antenna according to the reinforcement of an input signal like the flow chart which showed Mode a to drawing 4 .

[0029] Next, the cell phone unit of the second operation gestalt is explained. The perspective view of the cell phone unit of the second operation gestalt is shown in drawing 6 (a), and drawing of longitudinal section of BB cutting plane of drawing 6 (a) is shown in drawing 6 (b). In addition, in drawing 6 , the same sign is given to the same part as drawing 1 , and explanation is omitted. The touch sensor 11 is formed in the year piece section 4. As a touch sensor 11, the sensor equipped with the piezoelectric device, for example is mentioned.

[0030] Next, the circuit block diagram of the cellular phone of the second operation gestalt is shown in drawing 7 . In addition, in drawing 7 , the same sign is given to the same part as drawing 2 , and explanation is omitted. The detection signal detected by the touch sensor 11 is inputted into a control circuit 10.

[0031] Next, actuation of a control circuit 10 is explained with reference to the circuit block diagram of drawing 7 , and the flow chart of drawing 8 . A control circuit 10 outputs a control signal so that a circuit changing switch 8 may choose a nondirectional antenna 1 (step S210). Next, it judges whether the detection signal from a touch sensor 11 is inputted (step S220). If the detection signal from a touch sensor 11 is inputted (Yes of step S220), a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 (step S230). Then, it judges whether the detection signal from a touch sensor 11 is inputted again (step S240). If the detection signal from a touch sensor 11 is not inputted (No of step S240), it shifts to step S210.

[0032] In the cell phone unit of the second operation gestalt, since a control circuit 10 will output a control signal so that a circuit changing switch 8 may choose a directional antenna 2 if it is not related whether it is [voice] under message or there is nothing and a user detects that the lug was applied to the IYAPISU section 4 in a touch sensor 11, the electric wave radiate on a user head from an antenna is mitigable.

[0033] Moreover, also in the cell phone unit of the second operation gestalt, you may make it a configuration which a control circuit 10 may control a circuit changing switch 8 according to the reinforcement of an input signal like the cell phone unit of the first operation gestalt, and has the three modes of antenna selection.

[0034] In addition, in a cell phone unit, a non-voice communication link is also performed like data communication. In the cell phone unit of the first operation gestalt, since a non-voice communication link is not [voice / be / it] under

message, a nondirectional antenna is chosen during a non-voice communication link. Moreover, also in the cell phone unit of the second operation gestalt, during a non-voice communication link, since the lug does not touch the year piece section, a nondirectional antenna is chosen. Generally, in a non-voice communication link, there is an inclination for the direction of mobile communication equipment to tends to be changed by the user compared with a voice message. For this reason, the cell phone unit of the first operation gestalt and the cell phone unit of the second operation gestalt are considered as the configuration as which a nondirectional antenna is chosen by the non-voice communication link. However, this invention may be set up so that it may connect with a directional antenna at the time of the communication link which is not limited to the above-mentioned operation gestalt and includes not only a chisel but a non-voice communication link at the time of a voice message.

[0035] Moreover, although this invention was applied to the cell phone unit with the above-mentioned operation gestalt, this invention is applicable about the mobile communication equipment at large which is not limited to this and equipped with the radio function.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view and drawing of longitudinal section of a cell phone unit of the first operation gestalt concerning this invention.

[Drawing 2] It is the circuit block diagram of the cell phone unit of drawing 1 .

[Drawing 3] It is the flow chart Fig. showing actuation of the control circuit shown in drawing 2 .

[Drawing 4] It is the flow chart Fig. showing other actuation of the control circuit shown in drawing 2 .

[Drawing 5] It is the flow chart Fig. showing the actuation of further others of the control circuit shown in drawing 2 .

[Drawing 6] It is the perspective view and drawing of longitudinal section of a cell phone unit of the second operation gestalt concerning this invention.

[Drawing 7] It is the circuit block diagram of the cell phone unit of drawing 6 .

[Drawing 8] It is the flow chart Fig. showing actuation of the control circuit shown in drawing 7 . It is drawing.

[Description of Notations]

1 Nondirectional Antenna

2 Directional Antenna

4 Year Piece Section

6 Key Section

8 Circuit Changing Switch

9 Transceiver Section

10 Control Circuit

10A Memory

11 Touch Sensor

[Translation done.]